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Propeller blower, shell propeller

The invention relates to a propeller blower for substantially axially directing the outflow of gaseous or liquid media by means of a hub driven rotary around an axis of rotation, delimiting the flow on the inside and formed to the impeller disk, which comprises blades bent in the blade area between blade entrance edge and blade discharge edge in flow direction.

A known blower of this type (100 20 878 C2) is provided with a guide surface on the outside. Thereby only a strictly limited suction area is possible in the axial direction.

It is the object of the present invention, to design a propeller blower of this type such that the medium sucked in flows in in hemispherical manner and flows out in axial direction such that for example steams rising in kitchens can by captured extensively without using a hood.

This is achieved in the propeller blower of the type indicated above in that each conveying blade is formed in the shape of an oyster shell with longitudinal extension and is connected in an end portion with the impeller disk mentioned above and is perpendicular to the impeller disk at the connection line, while the other end portion is oriented with increasing radial distance in axial

direction. In that the blades comprise a concave curvature in the direction of rotation.

The blades resemble the pearl or river pearl oyster (Margaritana margaritifera) in their longitudinal, oval extension. The hub or impeller disk can have a flat shape, or it can be implemented as spheriod or in parabolic or hyperbolic shape.

The proposed propeller blower accelerates the conveyed medium in the inner area near the shaft mainly in radial direction. The described conveying blades bent concavely in the direction of rotation guide the medium flowing outwardly at the outer edge towards the axial direction such that an enclosure of the blower, for example by means of a pipe, is not required. A simple calculation and the experiment even show that medium is sucked in at the outer edge. That is, the circumferential velocity at the outer edge is larger there than the radial velocity of the medium achievable by centrifugal forces. Thus, for example, rising warm air in kitchens can be discharged without hood. The shape of the blades does also not allow any simple vibrations of the blades, which would create noise. Measurements confirm a noise level of the propeller blower, which is up to 8 dB lower compared to axial blowers of the same size operated at the same speed. By suitable shaping of the blades it can also be achieved that with the proposed blower the angle of the medium flowing off is opened up to approximately 25°. Since large amounts are entrained from the surrounding medium thereby, large volumes can be moved in this manner. In one of these

propeller blowers of 14 cm diameter blowing down from the ceiling 1 m^3/s air at 1250 rev/min were measured. Thus this small blower can replace the large, slowly running ceiling blowers.

The invention is explained below by way of example with reference to the drawing.

Fig. 1 shows a diagrammatic view of an impeller disk with only one blade for a propeller blower according to the invention.

Fig. 2 shows a diagrammatic view of the blade shown in fig. 1, detached from the impeller disk.

Fig. 3 shows the impeller disk with indentations and a blade.

Fig. 4 shows a sectional view according to A-B of fig. 2.

Fig. 5 shows a diagrammatic view of another propeller blower according to the invention.

According to the figures 1 to 3, the impeller disk 2 is driven rotary around the axis of rotation 3. The direction of rotation is indicated by the arrow 5.

For the sake of a better overview only one blade 1 is shown in the figures 1 to 3. In the practical implementation usually several blades 1, spaced uniformly of not

uniformly, also in different sizes, will be attached to the impeller disk.

The blade 1 has substantially the shape of an oyster shell and is integrally connected with the impeller disk 2, or incorporated or glued into it. They can be formed by injected or moulded parts; it is substantial that the blade 1 and the impeller disk 2 have entered into a so-called penetration such that a dedendum line 6 is created, which merges outside of the penetration into the discharge edge of the blade 1. The edge opposed to the dedendum line 6 is the blade entrance edge 22, at which the medium flows in. It can be seen in fig. 1 by the arrows 30 that the blade entrance edge extends up to the outer area. In the area 20 the blade 1 is oriented radially, while it is axially oriented in the area 21.

Figure 2 again illustrates the special shape of the blade 1, wherein in fig. 4 the section A-B from fig. 2 is shown. The angle 4 shown in fig. 4 indicates the inflow angle between the vector 5 of the rotary velocity and the edge direction of the blade 1.

In fig. 3 an indentation 4 in the impeller disk 2 can be recognised before the dedendum line 6, which contributes to the increase of the radial flow. With the proposed propeller blower also water and air crafts can be driven.

A propeller according to the invention is proposed in fig. 5, which also at its outer edge still sucks in the conveyed medium such as water or air. An especially advantageous

arrangement of this new propeller regarding the sucking in of air or other liquids from a space under differential pressure is obtained, when the location of the outer edges or propeller blades 1, where the sucking-in turns into the outflow, is situated according to fig. 5 exactly inside of a hole in the plane of the outer wall 10 of the space the medium is to be sucked off from. The plane of the outer wall is then, according to fig. 5, near the outer edge of the propeller blades 1. Arrows 30 indicate the flow direction. It is additionally illustrated in fig. 5 that the edges of the propeller blades 1 can be rounded such that the propeller blades do not have any corners, as shown in the bottom part of fig. 2.

The feature of a conically spread outflow, which can still be somewhat extended by suitable shaping, enables blowing of air through cooling pipes assembled in cooling packs, without the necessity of any limiting plates at the entrance or discharge edge. Thus, sucking off media from a room can be enabled, wherein the propeller is situated on the suction side inside the room and the opening is enclosed by a slotted pipe, in order to reduce the noise generated by Karman vortexes.